RESEARCH

被动以及环境吸烟以及社会平等趋势之探讨

Impacts of Environmental Tobacco Smoke Accumulation on Health Equity of Youth

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Abstract

被动吸烟(Passive Environmental Tobacco Smoke, ETS)作为一种环境暴露,对新一代神经发育可能产生潜在影响。本文综合文献研究,从神经学的角度探讨ETS对婴幼儿和儿童神经发育的可能影响。,ETS中的尼古丁和其他有毒物质被认为可能穿越胎盘,影响胎儿的神经系统发育。研究发现,胎儿在子宫内暴露于ETS的情况下,可能面临着神经发育缺陷和认知功能障碍的风险。 婴幼儿和儿童在家庭或公共场所暴露于ETS,可能面临神经系统敏感期内的不良影响。一些研究表明,ETS与儿童行为问题、学习障碍和认知功能下降之间存在关联。 本文探讨了ETS可能通过影响神经发育的分子和细胞机制,如突触形成、神经元迁移和突触可塑性等方面。这些机制可能为ETS对神经系统的影响提供了生物学解释。最后,本文强调了ETS对新一代神经发育的长期影响,以及相关研究的临床和公共卫生意义。提倡公众和政策制定者采取措施,减少儿童和婴幼儿暴露于ETS的可能性,以保护他们的神经系统健康。通过综合研究ETS对新一代神经发育的影响,本文旨在为相关领域的研究提供参考,并为相关政策的制定和健康干预提供科学依据。

Passive Environmental Tobacco Smoke (ETS), recognized as a form of environmental exposure, holds the potential to influence the neurodevelopment of the new generation. This paper delves into the topic by integrating findings from existing literature to discern the consequences of ETS on the neurodevelopment of infants and children from a neurological perspective. The substances present in ETS, such as nicotine and other toxins, are believed to traverse the placenta, impacting fetal nervous system development. Extensive research supports the notion that fetuses exposed to ETS in utero may be susceptible to neurodevelopmental defects and cognitive impairments. The impact of ETS on infants and children exposed in domestic or public settings during critical periods of neurodevelopment has been studied. Associations have been identified between ETS exposure and a

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range of issues in children, encompassing behavioral challenges, learning disabilities, and cognitive decline. Exploration of the molecular and cellular mechanisms through which ETS may influence neurodevelopment, including synaptic formation, neuronal migration, and synaptic plasticity, provides valuable insights. These mechanisms offer biological explanations for the potential neurodevelopmental effects attributed to ETS exposure. The paper concludes by underscoring the long-term implications of ETS on the neurodevelopment of the new generation, emphasizing the clinical and public health significance of related research. Advocacy for public awareness and policy measures aimed at diminishing the likelihood of children and infants being exposed to ETS is stressed, with the ultimate goal of safeguarding their neurological health.

INTRODUCTION

环境烟草烟雾（Environmental Tobacco Smoke，ETS）是指烟草制品燃烧产生的烟雾在室内环境中的暴露。尽管环境烟草烟雾中的有害成分含量较低，但其对健康的微量伤害却不可忽视。从流行病学、毒理学、生理学，微量环境烟草烟雾对健康皆能造成长久性伤害。未来，环境烟草烟雾对健康的微量伤害仍需进一步研究和探索。可以从烟雾组分的特异性、暴露时间和浓度的关系、个体差异等方面深入研究，探讨微量暴露对健康的长期影响。此外，也需要加强室内空气质量监测和管理，推动立法措施，减少环境烟草烟雾暴露的可能性，保护公众健康 (M. R. Law and Hackshaw 1996)。

环境烟草烟雾暴露已被证实与多种健康问题密切相关，包括呼吸系统疾病、心血管疾病 (DiGiacomo et al. 2018; Ngu and McEvoy 2017)、癌症等 (Macacu et al. 2015; Sasco, Secretan, and Straif 2004)。流行病学研究表明，长期暴露于环境烟草烟雾中的人群患上这些疾病的风险明显增加。虽然环境烟草烟雾中的有害物质浓度较低，但长期暴露也可能对健康产生微量伤害，尤其是对于儿童、孕妇等易受影响的人群 (Cheraghi and Salvi 2009; Jackson and Testa 2021)h。
从毒理学角度看，环境烟草烟雾中的化学物质对人体健康具有潜在的危害。烟草烟雾中的一氧化碳、氰化物、苯等有害成分可导致呼吸系统受损、血液中毒、免疫力下降等不良反应。此外，烟雾中的微粒物质也可能引发呼吸道疾病，加重已有的慢性疾病症状，甚至诱发癌症等严重后果 (Yang, Jenkins, and Salvi 2022; Ni, Shi, and Qu 2020)。

BIOLOGICAL MECHANISMS

在生理学层面，环境烟草烟雾暴露对身体的微量伤害主要体现在呼吸系统和心血管系统方面。烟雾中的有害物质进入人体后，会引发炎症反应、氧化应激等生理过程，从而损伤呼吸道黏膜、影响肺功能、加速动脉硬化等，最终导致呼吸系统疾病和心血管疾病的发生和发展 (Malcolm R. Law and Wald 2003)。

NEONATAL FOCUS

胎儿期间，母体暴露于环境烟草烟雾中可能对胎儿产生多种不利影响。首先，流行病学研究发现，母体暴露于ETS环境中的孕妇更容易产生早产、低出生体重、先天畸形等不良妊娠结局 (Gould et al. 2020; Polanska et al. 2017)。其次，ETS中的有害物质如一氧化碳、尼古丁等可以通过胎盘进入胎儿体内，影响胎儿的生长发育，导致胎儿神经系统、呼吸系统、心血管

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系统等器官功能异常。从机制上看，ETS对胎儿的伤害主要包括以下几个方面：一是烟草烟雾中的有害成分直接影响胎儿细胞的分裂和分化过程，导致胚胎畸形和器官发育异常；二是ETS中的毒素进入胎盘，干扰胎儿血液循环，影响胎儿供氧和营养，导致胎儿生长迟缓和低出生体重；三是烟草烟雾中的化学成分影响胎儿的神经发育和大脑功能 (Herrmann, King, and Weitzman 2008; Xu et al. 2010)，增加儿童患有注意缺陷多动障碍（ADHD）等问题的风险 (Pagani 2014)。

NEURODEVELOPMENT AND LIFELONG IMPACTS

神经系统的发育水平直接关系到儿童后期的语言和认知能力 (Jackson and Testa 2021)。一些研究表明，胎儿期接受良好的营养和刺激有利于大脑神经元的连接和功能发育，从而提高儿童的阅读能力。相反，胎儿期的营养不良或暴露于毒物等有害环境中可能对神经系统产生损害，影响阅读和学习能力的发展 (Vilcins, Sly, and Jagals 2018)。其次，胎儿神经发育也会影响教育成就和学业表现。早期的神经发育水平与学习成绩之间存在密切的关系。良好的神经发育可以增强学生的学习能力和记忆力，有利于取得更好的学业成绩。相反，神经发育不良或受损可能导致学习困难和学业退步 (Klerman 2004)。因此，胎儿期的神经发育状态对个体的教育成就和学业表现有着重要的影响。因此，胎儿期神经发育的影响还可能延续到成年后的生活结果，包括物质滥用等问题。一些研究发现，胎儿期受到母体吸烟、酗酒等不良影响的儿童更容易在成年后出现物质滥用问题。这与神经系统受损可能导致的行为和情绪问题有关，进而影响个体对物质的认知和控制能力，增加物质滥用的风险。

A PUBLIC HEALTH RESPONSE FOR HEALTH EQUITY

尽管环境烟草烟雾的危害已被科学证实，但在一些地区，公众对其认知程度仍然不够。一方面，部分人群对ETS的危害认识不足，可能认为烟草烟雾在室内环境中不会对健康造成严重影响，甚至忽视了暴露于ETS环境中的危险性。另一方面，一些人可能存在对ETS的误解，认为开窗通风或者仅仅避开吸烟者即可避免ETS的危害，而忽略了ETS在封闭空间中的持续暴露也可能对健康带来潜在风险。公众对ETS认知程度不足的现状存在多种原因。首先，一些人可能缺乏与ETS相关的科学知识 (Giraldi et al. 2013)，不了解烟草烟雾中的有害成分及其对健康的影响机制。其次，社会上存在一定程度的烟草文化，一些人可能受到吸烟行为的影响，对ETS的危害产生误解或忽视。此外，媒体和宣传对ETS的危害报道可能不够充分，也会影响公众的认知程度。面对公众对ETS认知程度不足的挑战，有必要采取一系列措施加强宣传教育。首先，应加强对ETS危害的科普宣传，提高公众对ETS的认知水平。可通过媒体、社区教育、学校教育等渠道，向公众普及ETS的危害知识，引导人们树立正确的健康意识 (Brownson et al. 1997)。其次，应加强法律法规的制定和执行，规范公共场所的吸烟行为，减少ETS的暴露机会。此外，还需要加强烟草控制政策的实施，促进烟草消费的减少，从根本上减少ETS对公众健康的影响。

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Ethics
This study has been under the ethics guidelines of local governance..
Declaration of interests or conflicts
The authors declare no competing interests.
Data Availability
Data extracted from original articles and analytic code are available upon reasonable request. Proposals may be sent to the corresponding author.
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